Achla Marathe

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Research Interests:

- Modeling and Simulation of Socio-economic Systems.
- Data Mining and Knowledge Discovery,
- Applied Econometrics and Statistics.
- Applications of Information Technology to Real-world Social and Economic Problems.

Dissertation:

Behavior of Equity Markets: Efficiency, Volatility and Integration.

Advisors: Prof. Bruce Dieffenbach, Dept. of Economics, SUNYA.
Prof. Hany Shawky, Dept. of Finance, SUNYA.

Education:

September 1989-August 1994 **University at Albany, SUNY**
Ph.D. (Financial Economics).

September 1988-May 1989 **University at Albany, SUNY**
M.A. (Economics).
Concentration: Applied Econometrics.

September 1986-June 1988 **Maharashi Dayanand University, Rohtak, India**
M.A. (Economics).
Concentration: Econometrics, Statistics.

September 1983-June 1986 **University of Delhi, India**
B.A. (Honors).
Major: Economics, Minor: Mathematics, English.

Awards:

1989-90	Fellowship awarded by the Economics Dept. SUNY-Albany.
1990-94	Graduate Assistantship awarded by SUNY-Albany.
1995-96	Achievement Award given by the Los Alamos National Laboratory.

Work Experience:

August 1997- Present	**Technical Staff Member.** Los Alamos National Laboratory. Investigation of information technology solutions for socio-economic problems.
October 1994- July 1997	**Postdoctoral Research Associate.** Los Alamos National Laboratory. Application of data mining and statistical techniques to tax and health care fraud problems.
April 1994- September 1994	**Consultant.** International Finance Corporation, World Bank Group. Analysis of emerging equity markets.
September 1993- March 1994	**Lecturer.** Finance 503, Department of Finance, SUNY at Albany.
May 1993- August 1993	**Summer Intern.** World Bank, Washington D.C. Research and analysis on liberalization of Korean equity market.
September 1992- April 1993	**Lecturer.** Economics 110, Department of Economics, SUNY at Albany. Teaching skills evaluated above average.
September 1991- August 1992	**Computer Assistant**. Department of Economics, SUNY at Albany. Managed and administered the daily computing needs of the department.
September 1990- June 1991	**Teaching Assistant**. Department of Economics, SUNY at Albany.

Computer Skills:

Languages:	Perl, C++
Databases:	Oracle, Mysql, SQL.
Statistical Packages:	Matlab, SPLUS,
	TSP for PC, Gauss, Micro TSP.
Graphics and Spreadsheets:	Harvard Graphics, Gnuplot, Excel, Lotus.
Word Processors:	LaTeX, T^3, MS-word, Word perfect, Xemacs.

Selected Projects:

- *Simulation of Deregulated Power Market:* This project aims at building a highly scalable, individual based, microscopic simulation tool for analyzing a deregulated electricity market. The goal is to create a system that can simulate the entire North American power market. Parameterized and scalable models of individual agents are being developed to meet these long term requirements. The simulation based analysis tool will provide government, policy makers, regulators and politicians, the necessary technology with which they could predict and foresee changes in the policies that they propose and any actions they potentially take. My work involves designing, modeling and simulating a comprehensive and detailed electricity market along with the physical electrical grid.

- *Environmental Aerosol Characterization:* This project aims at developing a real time biological agent detection system which can detect the presence of living biological agents in the environment. If successful, this system will be a vast improvement over the existing ones which require several hours. This system will be capable of collecting, analyzing and characterizing the atmospheric samples (called aerosols) which will then help in detecting the biological agent attacks. I am specifically involved in developing a stable model to characterize the environmental background by using data mining and statistical techniques.

- *Medicare Fraud Detection Project:* This project was a partnership undertaken between Health Care Financing Administration (HCFA) and Los Alamos National Lab. The goal of this project was to demonstrate a capability to detect the likelihood of Fraud Waste and Abuse (FWA) in Medicare claim line items in a pre-payment as well as post-payment mode by applying systematic and analytical computational methods. We developed several algorithms and data mining techniques to detect FWA at the individual claim level and at an aggregate (Provider and Beneficiary) level.

- *New York State Medicaid Fraud Detection Project:* This project was very similar in flavor to the Medicare fraud detection project. Our goal was to develop different features and scoring mechanisms to identify fraudulent, wasteful and abusive Medicaid providers. The multidimensional profiles of the providers were built using the raw claims data and features which were complex functions of the claims data.

- *Marking to Market of Derivative Securities:* The goal of this project was to provide a tool to the *Internal Revenue Service* to assess the fair market value of derivative securities. Due to important tax implications and lack of specialized knowledge on tax examiner's part, IRS had sought expertise of LANL to perform this task. The tremendous flexibility and ability of the derivative instruments to transfer risk, makes them critical to the efficient functioning of the global economy. However, unlike listed financial instruments which are traded on an exchange and thus have publicly known price, the price of these instruments must be determined from advanced computational models. I was specifically involved in developing a model which measured the credit spread of corporate bonds.

- *Emerging Market Analysis:* During my stay at the World Bank and the International Finance Corporation, I extensively analyzed the behavior and performance of the emerging equity markets. Responsibilities included writing a report on the analysis of IFC's equity portfolio management, administration, its past performance and expected evolution. Also, a detailed study on the liberalization of Korea's equity market to foreign investment.

Book:

Achla Marathe, "Studies on the Behavior of Equity Markets", *Garland Publishing* 1998.

Journal Publications:

- Achla Marathe and Hany Shawky, "Predictability of Stock Returns and Real Output," *The Quarterly Review of Economics and Finance*, volume 34, No. 4, winter 1994, pages 317-331.

- Hany Shawky and Achla Marathe, "Expected Stock Returns and Volatility in a Two Regime Market," *The Journal of Economics and Business*, Volume 47, No. 5, December 1995, pages 409-422.

- Achla Marathe and Edward Renshaw, "Stock Market Bubbles - Some Historical Perspective," *The Journal of Investing*, Volume 4, No. 4, winter 1995, pages 63-73.

- Achla Marathe and Hany Shawky, "Categorizing Mutual Funds Using Clusters", *Advances in Quantitative Analysis of Finance and Accounting*, Volume 7, pages 199-211, 1999.

- Srinivas Doddi, Achla Marathe, S. S. Ravi, David Torney, "Discovery of Association Rules in Medical Data", *Medical Informatics and the Internet in Medicine*, Volume 26, No. 1, 2001, pages 25-33.

- Achla Marathe and Hany Shawky, "Structural Relation Between Mortgage and Market Interest Rates", forthcoming in *Journal of Business Finance and Accounting.*

- Chris Barrett, Doug Cook, Vance Faber, Gregory Hicks, Achla Marathe, Madhav Marathe, Aravind Srinivasan, Yoram J. Sussmann, Heidi Thornquist, "Experimental Analysis of Algorithms for Bilateral-Contract Clearing Mechanisms Arising in Deregulated Power Industry", *Journal of Graph Algorithms and Applications*, Volume 7, No. 1, 2003, pages 3-31.

- Hany Shawky, Achla Marathe and Chris Barrett, "Estimating the Relationship between Electricity Futures and Spot Prices in the US", forthcoming in *Journal of Futures Market.*

- Sang Jun, Achla Marathe, Hany Shawky, "Liquidity and Emerging Market Returns", *Emerging Market Review*, Volume 4, Issue 1, March 2003, pages 1-24.

- Ismael Arciniegas, Chris Barrett, Achla Marathe, "Assessing the Efficiency of US Electicity Markets", *Utilities Policy*, Volume 11, Issue 2, June 2003, pages 75-86.

- Pallab Mozumder and Achla Marathe, "Implications of an Integrated Market for Tradable Renewable Energy Contracts", submitted to *Ecological Economics.*

- Chris Barrett, Chris Homan, Achla Marathe, Madhav Marathe, Shripad Thite, "Design and Software Architecture of an Electrical Power Market Simulator", In preparation.

- Chris Barrett, Achla Marathe, Madhav Marathe, "Paramterized Models for Large Scale Simulation and Analysis of Deregulated Power Markets," In Progress.

- Achla Marathe and Chris Barrett, "Impact of Regulatory Changes in California Electricity Market", In Progress.

Peer Reviewed Conferences:

- Sang Jun, Achla Marathe, Hany Shawky, "Liquidity and Stock Returns in Emerging Equity Markets" FMA European Conference, Dublin, Ireland. June 2003.
- Chris Barrett, Martin Dorzda, Achla Marathe and Madhav Marathe, "Analyzing Interaction Between Network Protocols, Topology and Traffic in Wireless Radio Networks", IEEE Wireless Communications and Networking Conference (WCNC), March 2003, New Orleans, Louisiana.
- Chris Barrett, Martin Dorzda, Achla Marathe and Madhav Marathe, "Characterizing the interaction between the routing protocols and the media access protocols, *Proceedings ACM conference on Mobile Adhoc networks, Mobihoc 2002*, Luzanne, Sweden June 2002.
- Chris Barrett, Doug Cook, Vance Faber, Gregory Hicks, Achla Marathe, Madhav Marathe, Aravind Srinivasan, Yoram J. Sussmann, Heidi Thornquist, "Experimental Analysis of Bilateral-Contracts", Proceedings of *5th Workshop in Algorithm Engineering (WAE2001)*, Springer's Lecture Notes in Computer Science series, U. Aarhus, Denmark, August 2001.
- Achla Marathe and Hany Shawky, "Structural Relation Between Mortgage and Market Interest Rates", presented at the *Academy of Financial Services*, Florida, October 1999.
- Achla Marathe and Edward Renshaw, "Stock Market Bubbles," presented at the *Neural Networks in Capital Markets* conference, California Institute of Technology, Pasadena, November 1994.
- Achla Marathe, "Macroeconomic Determinants of Emerging Stock Markets' Performance: Theory and Evidence," presented at the *First Annual Conference on Multinational Financial Issues*, Rutgers University, June 1994.
- Achla Marathe, "Do Stock Returns Depend on Monetary or Real Factors? An Empirical Analysis," presented at the *New York State Economics Association Conference*, Syracuse University, October 1992.

Other Conferences:

- Pallab Mozumder and Achla Marathe, "Implications of an integrated market for tradable renewable energy contracts", *Symposium 2002*, Los Alamos National Laboratory, July 28-29, 2002.

- Ismael Arciniegas, Chris Barrett, Achla Marathe, "Assessing the Efficiency of US Electicity Markets", *Symposium 2001*, Los Alamos National Laboratory, Aug 6, 2001.

Unpublished Reports:

- Achla Marathe and Camilo Gomez, "Corporate Bond Yield Spreads," *Los Alamos National Laboratory, Technical report number LA-UR-95-354*.
- Kwang Jun and Achla Marathe, "Impact of Equity Market Liberalization in Korea," *Los Alamos National Laboratory, Technical report number LA-UR-95-2226*.
- Nipa Basu and Achla Marathe, "Simulation of Economic Wars," LDRD proposal, Internal report, Los Alamos National Laboratory, June 1996.
- Achla Marathe, George Papcun and Luis Rocha, "Agent Based Simulation of a Globalized Economy," LDRD proposal, Internal report, Los Alamos National Laboratory, June 1999.
- Achla Marathe, Jane Booker and Sherry Parker, "Environmental Aerosol Sample Analysis", *Los Alamos National Laboratory, Technical report number LA-UR-99-5331* , September 1999.
- Mike Fugate, Achla Marathe and Clint Scovel, "Logistic Regression with Incomplete Choice-Based Samples", *Los Alamos National Laboratory, Technical report number LA-UR-00-1252*, 2000.
- Achla Marathe, Chris Barrett and Gabriel Istrate, "Computational Economics in Policy Formation and Decision Making", LDRD proposal, Internal report, Los Alamos National Laboratory, March 2001.
- Achla Marathe and Chris Barrett, "Market Power in Power Market", Los Alamos National Laboratory, *Technical report number LA-UR-01-4335*.